(691)

RESEARCH REPORT SERIES

New Series No. 5

An Aggregate Consumption Function for Bangladesh

by

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October 1972.

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Interest of the economists and statisticians in estimating aggregate consumption function was aroused with the publication of J.M. Keynes' General Theory of Employment Interest and Money in 1936. On the basis of pure intuitive reasoning, Keynes developed two fundamental hypotheses about the relationship between consumption and income. These were:

(i) Real consumption is a stable function of real income, and

(ii) the proportion of the incremental income consumed (marginal propensity to consume) is positive but less than one.

He also developed two other related hypotheses -- although the evidence revealed later by statistical data did not always support them -- which stated that the marginal propensity to consume is less than the average propensity and that the marginal propensity declines as income rises. What is most important to note is that Keynes proposed an important aggregative relationship which could form the basis towards formulating various economic policies affecting the growth of the economy.

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It should be noted here that Keynes' analysis was in terms of real income and consumption as opposed to money income and consumption. In other words, he wanted both series to be corrected for the underlying price changes. Besides, there is some question with respect to the concept of income to be used in the analysis. Most authors agree that it is the disposable income (after tax income) that is relevant here. In this exercise, the income series for Bangladesh refer to the disposable income. Both income and consumption series are expressed in constant prices so as to eliminate the effect of price changes.

One further question remains to be solved. This is related to whether the consumption expenditure data should include consumption by all agencies, e.g., household sector, non-household private sector, government, etc. In reality, the consumption expenditure of the government cannot always be fitted into an explicit behavioral relationship, and most of the models treat this component as exogenous. So here the government consumption expenditure was taken out of the total consumption expenditure. Hence, the consumption series relates only to the private consumption.

II

In this section the choice of the model will be discussed. As pointed out above, the Keynesian consumption function involved only income and consumption however defined. Further sophistication was introduced to obtain a better explanation of

the consumption expenditure and also to provide a framework which will predict future consumption more accurately. So behind all possible models of income-consumption relationship, the goal of deriving a reliable predictor is ever present. This leads to the problem of choice of variables in the model. It is obvious that the dependent variable is the private consumption expenditure, and the major independent variable is disposable income. At this stage, the question of total vs. per capita unit comes in. If it is considered that population affects the growth of consumption independently of income, then there is a case for introducing it into the model in some from. This may be accomplished by either expressing the income and consumption series in per capita terms or by including population as an explicit variable into the model or a combination of both.

Introduction of population variable into the consumption function may be justified in the case where the time span involved is very long, or where the rate of growth of population is very high. The present series for Bangladesh is not very long -- in fact, it includes only ten observations (1959/60 to 1968/69) -- but the rate of growth of population has been very high (according to some estimates as high as 3.0 per cent per annum) compared with the experience of any other region at the same level of income. Thus, evidently this warrants the inclusion of some correction factor for population changes.

With the above considerations in mind, several models have been experimented with. The functions have been estimated by applying the method of least squares.

All of the various formulations of the consumption function c nsidered here are discussed below.

Model I: This is a simple Keynesian consumption function which expresses total private consumption as a linear function of total disposable income, i.e., $C = \alpha_C + \beta_C Y$, from which it follows that dC/dY = marginal propensity to consume = β_C.

Model 2: Here population is introduced explicity as an explanatory variable into the model. Thus the consumption function stands as $C = \alpha_1 + \beta_1 Y + \gamma_1 P$, where P = Total Population and $\frac{dC}{dY} = \beta_1$.

Model 3: This examines if there is any underlying nonlinearity in the income-consumption relationship as expressed by Keynes. It is proposed that if the Keynesian hypothesis of a declining marginal propensity to consume were true, then the coefficient corresponding to a square term in disposable income should have a negative sign. The relationship, in this case, can be written as $C = \alpha_2 + \beta_2 Y + \gamma_2 Y^2$, with $\frac{dC}{dY} = \beta_2 + 2\gamma_2 Y$.

Model 4: The variables in Model I are expressed in per capita terms, and the relationship is written as $c = \alpha_3 + \beta_3 y$, where c = C/p, y = Y/p, and $\frac{dC}{dY} = \beta_3$.

Model 5: This is the final formulation that was experimented with in this exercise. Total private consumption is expressed as a linear function of per capita income and population. So the relationship function of per capita income and population is written as $C = \alpha_4 + \beta_4 Y + \gamma_4 P$, with $\frac{dC}{dY} = \frac{\beta_4}{P}$.

From the above, it is clear that in Models 1, 2, and 4, the marginal propensity to consume is assumed to be constant. Model 3 implies that the marginal propensity to consume is a function of Y, and to be consistent with the extended Keynesian hypothesis, γ_2 should be negative. Finally, in Model 4, the marginal propensity to consume turns out to be a function of population alone. In other words, assuming $\beta_4 > 0$, the marginal propensity to consume out of income is inversely related to population irrespective of the level of income.

It is important to note here that all of the above models are single equation models and that only one way causality has been assumed. However, total private consumption being a very significant component of the total disposable income, the latter itself may be influenced by the former. So what may really be involved is one of a system of simultaneous relationships in which both income and consumption are endogenously determined. In a situation like this, the application of direct regression of C on Y (or for that matter on Y and p) will result in estimates which will be biased and inconsistent since the least square assumption of the independence of explanatory variables and the error term will be violated. So the use of direct single equation regression analysis used here

implies that income series is purely exogenous (not a very valid assumption) and that for the purpose of predicting C in some future year, t, independent estimate of Y_t will be available[1].

III

This section will be devoted to the discussion of the nature and source of data used for estimating the coefficients of the various regression models described in Section II. There types of basic data were involved in the regression estimates. These are: a) disposable income, b) private consumption expenditure, and c) population. A detailed description of the methodology for estimating (a) and (b) is contained in a separate working paper by the author, so these will be discussed here only briefly.

Disposable Income

Gross Domestic Product at constant factor cost is taken from the work of Alamgir and Berlage (1971)[2] at the Harvard University Center for Population Studies. The authors start with the official data provided by the Central Statistical Office and carry out two adjustments to it. The first corresponds to the correction for the fact that the official data overestimates the rice (aman

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[1] The real constraint, in this instance, in developing a more complete model of income determination out of which a consistent estimate of the coefficient of the consumption function would have emerged, is imposed by availability of data.

[2] Alamgir, M., and Berlage, L., "National Accounts of Bangladesh," working paper at the Harvard University Center for Population Studies (December, 1971).

variety) production and underestimates the jute production. Secondly, the official figures did not include certain unallocated items, e.g., banking and insurance, central government and the Pakistan International Airlines. The value added from these sectors was divided between Bangladesh and Pakistan on the basis of 25 and 75 per cent respectively. To obtain Gross National Product at factor cost, it was necessary to derive separate estimate of net factor income from abroad for Bangladesh. Such data were not available from official sources. Therefore, all Pakistan data in current prices was divided between the regions on a 50% basis. In order to arrive at constant price estimate, the current price figures were deflated by the import price index when net factor income from abroad was positive and by the export price index when it was negative. For deriving the series for disposable income, an estimate of total direct taxes collected from Bangladesh had to be obtained. Provincial direct tax figures were taken from Economic Survey of East Pakistan1969/70, and the central direct tax figures were taken from Budget in Brief 1970-71. Since the latter did not give the tax figure for 1959/60 separately for Bangladesh, the all Pakistan figure for that year was divided between the regions on the basis of 1960/61 proportion. Direct tax series in constant 1959/60 prices was obtained by deflating the current price series by the implicit GNP (at factor cost) deflator. The shortcomings of the underlying data used to derive the estimate of disposable income are discussed in the working paper mentioned above.

Private Consumption Expenditure: Estimate of private consumption expenditure was arrived at in three steps. (I) First, independent estimate of total fixed investment was obtained from three different documents put out by the Planning Commission, e.g., Final Evaluation of the Second Five Year Plan 1960-65, Memorandum for the Pakistan Consortium 1967-68, and Preliminary Evaluation of the Third Five Year Plan (1965-70). These estimates do not include stock formation, which is treated separately in the above documents. (2) Secondly, data on import surplus were taken from the Reports of the Advisory Panels for the Fourth Five Year Plan 1970-75, Vol. I. The panel report did not provide data on invisible trade for 1959-60 or 1960-61. Estimates for these years were obtained by filling linear time trends to the data for the period 1961-62 to 1968-69. Then an estimate of total saving of the economy was derived by subtracting import surplus from the estimate of total investment (fixed investment and stock formation). The saving estimate thus includes both private (household and business sector) and government saving. (3) Finally, the total consumption expenditure was estimated as the difference between Gross National Product at current prices and total saving as derived above. The total consumption expenditure series for Bangladesh was allocated between government and private consumption on the basis of the proportions revealed from the all Pakistan data. The total private consumption series at constant 1959-60 prices was obtained by deflating the current price series by the implicit GNP (at factor cost) deflator.

Population: Estimate of yearly population of Bangladesh over the period 1959-60 to 1967-68 is taken from Alamgir, M., "Population and Labour Force of Bangladesh (1961-2001)"; Working paper at the Harvard University Center for Population Studies (October, 1971). All the basic data used for regression estimates are presented in Table 1.

IV

As pointed out before, the regression models described in Section II were estimated by applying ordinary least squares. The scatter diagram of private consumption and disposable income is presented in Chart 1. As expected, this suggests a very close relationship between the two and indications are that the functional form which will emerge as the most desirable one out of the different possibilities will be linear in income. The regression estimates along with all relevant statistics are presented in Table 2.

The Model 1 which represents the simplest form of the aggregate consumption function has a significant (at 99% level) slope coefficient and quite a high value for the coefficient of determination (R^2 = 0.99517). The estimated marginal propensity to consume given by the constant slope is 0.84. This implies that 84% of the incremental income in Bangladesh goes to consumption. Considering that fact that income here refers to disposable income, a figure of 0.84 for the marginal propensity to consume appears to be slightly on the low side. In point of fact, this happens to be in the region which is observed in the case of

developed from moderately developed countries.[3] So a new variable, population was introduced and several alternative specifications were tried to obtain a more realistic estimate of the marginal propensity to consume.

When population was introduced as an explanatory variable in addition to disposable income (Model 2), the coefficient of determination improved slightly, and the standard error of estimate declined. In addition, the estimate of the marginal propensity to consume came out to be higher than that in Model 1 (mpc = 0.91). However, the coefficient of the population variable itself was not significant at any conventional level (95 or 99 per cent), and it had the wrong sign. This implies that given the specification of the model, the sample information was not adequate to produce a significant coefficient of population with the proper sign. Therefore, in spite of some desirable characteristics, Model 2 could not be accepted.

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[3] This statement, however, needs some qualification, since the magnitude of the income coefficient varies with respect to the length of the time series used. Usually estimates on the basis of short run data has been lower than those based on long time series. For example, a single function to the combined pre war and post war periods, i.e., 1929-40 and 1946-58, data for the United States produced the following estimate: C = 104.9 + 0.86 di, where C = per capita consumption and di = per capita disposable income. This should be compared with the estimate for short periods, such as 1929-40, for which the function is C = 171.6 + 0.79 di and 1946-57, with the function C - 186.3 + 0.81 di. All data represent annual figures and are expressed in billions of 1954 dollars. These equations are taken from G. Ackley, Macroeconomic Theory (New York: The Macmillan Company, 1961), pp. 248, 252. Using aggregate quarterly data for the post war period 1947-54, Zellner obtains even a lower estimate for marginal propensity to consume. His equation is, C = 38.09 + 0.747Y. See Zellner A., "The Short Run Consumption Function," Econometrica, Vol. 25, October, 1957.

As somewhat of a digression, the nonlinearity assumption in terms of disposable income was tested in Model 3. It can be seen from Table 2 that the results are very poor indeed. The estimate of the marginal propensity to consume is very low (0.76 for average disposable income), and the coefficient of the income term is insignificant. This implies either that the model specification is incorrect or the income variable is highly correlated with the square term which will cause the coefficients to be arbitrarily distributed between the two variables. As in the case of Model 2, the informational content of the sample is quite inadequate to obtain reliable estimates for both of the coefficients.

Introduction of the consumption and income variables in per capita terms (Model 4) did not improve the estimate of the marginal propensity to consume (mpc = 0.79), although as expected, the estimate was significant. The estimates of this model are in fact very similar to Model I were the total variables were used for regression.

Finally, Model 5, in which total private consumption was regressed on per capita disposable income and population produced a reasonable estimate of the marginal propensity to consume with significant coefficients. Although the standard error of estimate was higher than those in other models using total private consumption as the dependent variable, both coefficients with respect to per capita income and population were significant at 99% level. The coefficient of population had the right sign (positive). The beta coefficients reveal that both variables are

equally important in explaining the variation in total private consumption. The estimated marginal propensity to consume at the average population was 0.85, which still falls below the expected range for Bangladesh. The multiple correlation coefficient is higher (R = .996895) than that in Model 4, but a little lower than that in Models 1, 2 and 3.

As is clear from the above, reasonable estimates of the marginal propensity to consume based on statistically significant regression coefficients are provided by Models 1, and 5 . Analysis of residuals for these two hypotheses reveals that the assumption of a normally distributed error term with zero mean and unit standard deviation is a very close approximation of reality. This is reflected by the fact that almost all of the normal deviates (Tables 3 and 4) fall within the range of -1.96. Further, the time sequence plot of the residuals (Charts 2 and 3) show that they are distributed quite randomly in the sense that there does not seem to be any systematic pattern in the position of the residuals, although in the case of Model 5 there is some bunching of negative residuals at the middle of the time period. From the absolute magnitude of the residuals, it can be seen that the largest residual is less than 3% of the actual value of the dependent variable.

V

From the above, it follows that given the limitation of data, it is not possible to estimate an elaborate consumption function for Bangladesh. Of the different models experimented with, the one involving population and disposable income (Model 5) produced the highest estimate of marginal propensity to consume. For the period under consideration, this estimate was perhaps closer to reality than any other. However, if one is interested in long-run predictions of total private consumption, then the criterion for choice of function should be minimum variance. According to this criterion, Model I is obriously superior to Model 5. One additional problem may arise if Model 5 is used for long-run prediction. It was pointed out above that in this model, the marginal propensity to consume is inversely related to population. This implies that as the population grows over time, the marginal propensity to consume will be declining. Hence, depending upon the rate of growth of population and the relation between population and income, the saving rate implied by this function at any point of time may be much higher than what is considered to be feasible. For example, if population is assumed to grow at a compound annual rate of three percent, the implicit marginal saving rate in 1986 will be 56. 1%, which is undoubtedly higher than what is usually observed, even in highly developed countries. On the other hand, the conventional Keynesian consumption function (Model 1) implies a constant marginal saving rate of 16% out of private disposable income. This is lower

than that achieved by some of the developing countries, but it represents a much higher level than the rates realized during the past decade or two in Bangladesh. So, the general conclusion suggested is that Model 5 can be used to explain variation in total private consumption in the short run, but as a basis for long-run prediction for planning purposes, Model I has more desirable properties. Long term projection of aggregate consumption is discussed in the following section.

VI

Results from long-term projection of aggregate consumption over the period 1972-73 to 1990-91 on the basis of Model I and Model 5 are presented in Table 5. Population projection is taken from [2]. Five yearly rate of growth of population was used to interpolate yearly population. Disposable income series was obtained in two steps. First, an estimate of gross Domestic Product for 1969-70 was made by correcting the C. S. O. estimate along the lines suggested in [3]. To this net factor income from abroad was added and direct taxes subtracted to obtain the estimate of disposable income. It was then assumed that in 1972-73, the level of disposable income will be the same as that of 1969-70. Secondly, the disposable income of 1972-73 was extrapolated upto 2001 by using growth rates, close to what was obtained in a study by Dorfmam, Alamgir and Tabors at Harvard University [4].

To be more specific, for the period between 1972-73

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4. These estimates are discussed in details in Appendix A.

and 1977-78, the assumed annual componnd rate of growth of disposable income was 5 per cent and for the following period (1977-78 to 1990-91) it was assumed to be 7 per cent.

As expected both Table 5 and chart 4 indicates that Model 5 implies a much slower rate of growth of consumption than Model I. While over the period 1972-78 Model I implies a rate of growth of consumption of 4.84 per anum, growth rate under Model 5 is only 2.70. Corresponding figures for the period 1977-1991 are 6.9 and 4.9 respectively. According to Model I average propensity to consume declines from .86 in 1972-73 to .85 in 1990-91. For the same period Model 5 produces much sharper decline, from .87 to .61. As pointed out before, the implicit marginal propensity to save under these two models are widely divergent and results from model 5 does not appear to be very realistic. In fact, it is apparent that even for a relatively short run, projection of aggregate consumption on the basis of Model 5 may be quite misleading. What one could perhaps add here is that Model 5 probably provides the absolute upper limit to marginal propensity to save at various stages of development of the Bangladesh economy although it is very unlikely that such socio-political institutions would emerge as to actually realise so high savings rate.

VII

The above discussion about an aggregate consumption function for Bangladesh suggest the following conclusions.

(i) On the basis of available data, it is possible to test alternative hypotheses about the realationship between consumption and disposable income of Bangladesh.

(ii) Since aggregate consumption series is derived indirectly as a residual, results can not be accepted with the same degree of confidence as it would have been had this series been estimated directly. This calls for attempt to develop in the future a consumption series which is estimated directly.

(iii) For long-term projection of aggregate consumption, it is desirable to develop a more comprehensive model where aggregate disposable income will be determined endogenously.

(iv) Available evidence suggest that marginal propensity to save in Bangladesh was about .15.

(v) Of all different models experiment with, a simple Keynesian consumption function seems to provide a reasonable basis for explaning variation in aggregate consumption in the past, as well as for predicting consumption in the future.

(vi) Limits set by Model I and Models 5 on the rate of growth of consumption indicate that over the next two decades aggregate private consumption is likely to grow on the average at an annual compound rate of growth of 5 per cent.

(vii) In order to sustain a high rate of growth of investment and income, domestic resource mobilisation must be higher than what it has been in the past. If the behavioural relationship indicated in Model I holds true over the period of projection, then further resource mobilisation must come by increasing government saving faster than private saving. Thus, if the target marginal rate of saving for the entire economy be 20 per cent, then government saving must be well above 20 per cent.

TABLE I

Disposable Income, Private Consumption and Population

Bangladesh 1959/60 - 1968-69

1 Year	2 Disposable Income (Tk. Million/ 1959-60 Prices)	3 Private Consumption (Tk. Million/ 1959-60 Prices)	4 Population (Million)
1959-60	14056	12368	51.93
1960-61	14754	13449	53.31
1961-62	15655	13789	54.72
1962-63	15712	13923	56.17
1963-64	17168	15158	57.66
1964-65	17640	15457	59.19
1965-66	18379	16109	60.76
1966-67	18957	16643	62.46
1967-68	20449	18033	64.21
1968-69	20943	18315	66.01

Notes and Sources:

1) Col. 2 and 3 : Taken from Alamgir, M., "Regional Product and Expenditure - Bangladesh 1959/60 - 1968/69," Working paper at the Harvard University Center for Population Studies (October, 1971), Table 2 and Table 4.

2) Col. 4: Taken from Alamgir, M., "Population and Labour Force of Bangladesh 1961-2001," working paper at the Harvard University Center for Population Studies (October 1971) Table 2.

TABLE 2

Consumption Function - Regression Results

Symbols used:

C = Aggregate Private Consumption

Y = Aggregate Disposable Income

c = Per Capita Private Consumption

y = Per Capita Disposable Income

P = Population

, , are parameters of the consumption function

Aggregate consumption and income are expressed in Taka /million.

Population is expressed in millions.

Figures within parenthesis are t-statistics.

Model I

$C = \alpha_0 + \beta_0 Y$

$C = 686.068 + 0.84Y$
$\quad\quad\quad\quad (40.59)$

See = 145.925

R^2 = 0.995168

beta (Y) = 0.997581

mpc = 0.84

Model 2

$C = \alpha_1 + \beta_1 Y + \gamma_1 P$

$C = 1490.08 + 0.91Y - 33.74P$
$\quad\quad\quad\quad (4.25) \quad (0.32)$

See = 145.892

R^2 = 0.995237

beta (Y) = 1.07764

beta (P) = -0.03042

mpc = 0.91

TABLE 2

(Continued)

Model 3

$C = \alpha_2 + \beta_2 Y + \gamma_2 Y^2$

$C = 2133.71 + 0.67Y + .0000048Y^2$
(1.74) (0.43)

See = 154.011

R^2 = 0.995291

beta (Y) = 0.798857

beta (Y^2) = 0.199038

mpc = 0.76

Model 4

$c = \alpha_3 + \beta_3 y$

$c = 28.29 + 0.79y$
(14.24)

See = 2.72191

R^2 = 0.962069

beta (y) = 0.980851

mpc = 0.79

Model 5

$C = \alpha_4 + \beta_4 y + \gamma_4 P$

$C = -13897.2 + 49.63y + 248.56P$
(3.50) (5.04)

See = 176.734

R^2 = 0.993799

beta (y) = 0.411977

beta (P) = 0.592866

mpc = 0.85

* In Models 3 and 5, the mpc (marginal propensity to consume) corresponds to the average disposable income (Tk. 17371.3) and population (58.64) respectively for the period 1959/60 to 1968/69.

TABLE 3

Analysis of Residual (Model I).

Time	Observed C	Estimated C	Residual	Normal Deviate
1	12363	12530.7	-162.69	-1.115
2	13449	13118.9	330.13	2.262
3.	13789	13878.1	-89.12	-0.611
4	13923	13926.2	- 3.15	-0.022
5	15158	15153.1	4.92	0.034
6	15457	15550.8	-93.83	-0.643
7	16109	16173.6	-64.56	-0.442
8	16643	16660.6	-17.63	-0.121
9	18033	17917.9	115.10	0.789
10	18315	18334.2	-19.18	-0.131

Note: Normal Deviate is obtained by dividing the residual by the Standard error of estimate.

TABLE 4

Analysis of Residual (Model 5).

Time	Observed C	Estimated C	Residual	Normal Deviat
1	12368	12444.9	- 76.88	-0.435
2	13449	13090.0	359.01	2.031
3	13789	13903.7	-114.75	-0.649
4	13923	13948.0	-24.97	-0.141
5	15158	15212.9	-54.87	-0.310
6	15457	15607.0	-149.96	-0.849
7	16109	16218.7	-109.66	-0.620
8	16643	16691.9	-48.89	-0.277
9	18033	17869.6	163.39	0.925
10	18315	18257.4	57.57	0.326

TABLE 5

Long-term Projection of Aggregate consumption - Bangladesh
1972-73 to 1990-91.

r	P Population (Million)	Y Disposable Income (Million Taka)	y Per Capita Disposable Income (Taka) $y = \frac{Y}{P}$	C_1	C_2
-73	74.274	23,055	310	20052.27	19949.65
-74	76.642	24,208	316	21020.79	20836.02
-75	79.085	25,418	321	22037.19	21691.40
-76	81.607	26,689	327	23104.83	22646.05
-77	84.348	28,023	332	24225.39	23545.50
-78	87.182	29,424	338	25402.23	24547.70
-79	90. 110	31,484	349	27132.63	25821.41
-80	93.137	33,688	362	28983.99	27218.99
-81	96.270	36,046	.374	30964.71	28593.29
-82	99.418	38,569	388	33084.03	30070.58
-83	102.669	41,269	402	35352.03	31573.47
-84	106.026	44,158	416	37778.79	33102.70
-85	109.494	47,249	432	40375.23	34758.79
-86	113.064	50,556	447	43153.11	36390.60
-87	116.589	54,095	464	46125.87	38110.48
-88	120.225	57,882	481	49306.95	39857.96
-89	123.973	61,934	500	52710.63	41732.53
-90	127.839	66,269	518	56352.03	43586.80
-91	131.829	70,908	538	60248.79	45571.16

and Sources:

1. Population and Disposable Income - See text.
2. C_1 is calculated on the basis of Model I and C_2 on the basis of Model 5.

APPENDIX - A.

Estimation of Disposable Income of Bangladesh in 1969-70

Gross Domestic Product at 1954-60 factor cost without unallocated items = Tk. 22624 m. This figure was provided by Bangladesh Bureau of Statistics. Unallocated items were Banking and insurance, PIA and central government. For banking and insurance all Pakistan data was available, of which 25% was attributed to Bangladesh. This figure came to Tk. 189 million. All Pakistan figure for PIA and central government were not available separately so that it could not be ascertained what total amounts were to be divided between Bangladesh and Pakistan. Hence it was assumed that value added originating from these two sectors in Bangladesh in 1969-70 would be the same as those in 1968-69. These figures were Tk. 35 million and Tk. 371 million respectively [ ]. Thus the gross Domestic product of Bangladesh in 1959-60 factor cost was Tk. 23219 million. To this Tk. 5 million was added as net factor income from abroad to obtain Gross National Product. This was the figure for 1968-69. For deriving disposable income direct tax had to be estimated and this was done in the following way.

a) Income and corporation tax. Linear time trend was fitted to the data for 1960-61 to 1968-69 which was extrapolated to obtain an estimate for 1969-70.

b) Estate duty and Rehabilitation tax. Average over 1964-69 was taken as the estimate for 1969-70.

c) Wealth and Gift tax. Average over 1967-69 was taken as the estimate for 1969-70.

Basic data/a, b and c above were obtained from Budget in Brief 1970-71.

Estimates of other two types of direct taxes, agricultural income tax and land revenue were obtained directly from budget documents. Thus an estimate of Tk. 229.3 million was obtained as direct tax collection of 1969-70 for Bangladesh. In the absence of any other alternative, direct tax estimate in constant 1959-60 prices was obtained by deflating the current price estimate by 1968-69 GNP (at factor cost) deflator. Finally, constant (1959-60) price disposable income of Bangladesh for 1969-70 was arrived at by subtracting direct taxes of the amount Tk. 169 million from GNP at factor cost.

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